

CLAIM AMENDMENTS

1. (Currently Amended) A via-filling material ~~filled in filling~~ a via hole previously when a trench, wider than ~~said the~~ via hole, is formed by ~~conducting~~ plasma etching ~~in via~~ hole part in ~~an~~ insulating film including the via hole, wherein said via-filling material ~~comprises comprising~~ a polymer containing a ~~repeat~~ repeating unit represented by the following formula (1):



~~in which wherein~~

R_1 is a member selected from the group consisting of hydrogen atom, fluorine atom, chlorine atom, bromine atom, and methyl group;

R_2 is a member selected from the group consisting of hydrogen atom, a C_{1-3} alkyl group, and a C_{1-4} alkyl group in which the hydrogen atom is ~~substituted replaced~~ by at least one kind of atoms of fluorine, chlorine, and bromine atom; and

X is $-C(=O)O-$ or $-S(=O)_2O-$.

2. (Original) The via-filling material of Claim 1, wherein said polymer has a weight average molecular weight of 1,000 to 200,000.

3. (Currently Amended) A via-filling material ~~filled in filling~~ a via hole previously when a trench, wider than ~~said the~~ via hole, is formed by ~~conducting~~ plasma etching ~~in via~~ hole part in ~~an~~ insulating film including the via hole, wherein said via-filling material ~~comprises comprising~~ a copolymer of a first monomer and a second monomer containing an unsaturated group which brings about a copolymerization reaction with said first monomer and a functional group capable of crosslinking the copolymer, ~~and~~ wherein said first monomer ~~being is~~ represented by the formula (2):



in which

R_1 is a member selected from the group consisting of hydrogen atom, fluorine atom, chlorine atom, bromine atom, and methyl group;

R_2 is a member selected from the group consisting of hydrogen atom, a C_{1-3} alkyl group, and a C_{1-4} alkyl group in which the hydrogen atom is substituted replaced by at least one kind of atoms of fluorine, chlorine, and bromine atom; and

X is $-C(=O)O-$ or $-S(=O)_2O-$.

4. (Currently Amended) The via-filling material of Claim 3, wherein said functional group capable of crosslinking the copolymer is an unsaturated group.

5. (Currently Amended) The via-filling material of Claim 3, wherein said functional group capable of crosslinking the copolymer is an epoxy group.

6. (Original) A via-filling material comprising a mixture of the copolymer of Claim 4 and an unsaturated compound containing at least two unsaturated groups.

7. (Original) A via-filling material comprising a mixture of the copolymer of Claim 5 and an epoxy compound containing at least two epoxy groups.

8. (Currently Amended) A via-filling material filled in filling a via hole previously when a trench, wider than said the via hole, is formed by conducting plasma etching in via hole part in an insulating film including the via hole, wherein said via-filling material comprises comprising a mixture obtained by mixing of a compound selected from melamine compounds containing at least two methoxymethyl groups, urea compounds containing at least two methoxymethyl groups, and epoxy compounds containing at least two epoxy groups to, with a copolymer of a first monomer and a second monomer, wherein

said second monomer is an unsaturated compound containing a functional group selected from hydroxyl group, carboxyl group, and dicarboxylic anhydride group, and wherein

said first monomer is represented by the formula (2):



in which

R_1 is a member selected from the group consisting of hydrogen atom, fluorine atom, chlorine atom, bromine atom, and methyl group;

R_2 is a member selected from the group consisting of hydrogen atom, a C_{1-3} alkyl group, and a C_{1-4} alkyl group in which the hydrogen atom is substituted replaced by at least one kind of atoms of fluorine, chlorine, and bromine atom; and

X is $-C(=O)O-$ or $-S(=O)_2O-$.

9. (Currently Amended) A process for fabricating a semiconductor integrated circuit, ~~which comprises the steps of comprising:~~

forming a stopper film on ~~the surface of~~ a lower insulating film on which a first conductor is ~~formed present~~ and ~~laminating~~ depositing an upper insulating film, ~~interposing so that said stopper film is interposed between said lower and upper insulating films;~~

forming a via hole leading from ~~the surface of~~ said upper insulating film to ~~the surface of~~ said stopper film ~~at the position where opposite~~ said first conductor ~~is located below;~~

applying ~~the~~ a film of said via-filling material of Claim 1 ~~on the surface of~~ to said upper insulating film ~~to fill and filling~~ said via hole with said via-filling material;

solidifying said via-filling material;

forming a resist pattern defining an opening part, including said via hole, on the ~~applied film made of a via-filling body obtained by solidifying~~ said via-filling material;

forming a trench ~~of a depth which that~~ does not reach said stopper film in said upper insulating film by dry etching said upper insulating film and said via-filling body material, using said resist pattern as a mask;

removing said resist pattern, ~~the film of said applied film made of via-filling body material,~~ and said via-filling body material remaining in said via hole ~~and;~~

etching said stopper film ~~appeared on the bottom of exposed in~~ said via hole, thereby exposing said first conductor; and

forming a second conductor in said trench and in said via hole.

10. (Currently Amended) A process for fabricating a semiconductor integrated circuit, ~~which comprises the steps of comprising:~~

forming an insulating film on a substrate;

forming a via hole in said insulating film;

applying ~~the~~ a film of said via-filling material of Claim 1 on ~~the surface of~~ said insulating film ~~to fill and filling~~ said via hole with said via-filling material;

solidifying said via-filling material;

forming a resist pattern defining an opening part, including said via hole, on the applied film made of a via filling body obtained by solidifying said via-filling material;

forming a trench of a depth which that does not reach said substrate in said insulating film by dry etching said insulating film and said via-filling body material, using said resist pattern as a mask;

removing said resist pattern, applied the film made of said via-filling body material, and said via-filling body material remaining in said via hole; and

forming a conductor in said trench and in said via hole.

11. (Currently Amended) A process for fabricating a semiconductor integrated circuit, which comprises the steps of comprising:

forming a stopper film on the surface of a lower insulating film on which a first conductor is formed present and laminating depositing an upper insulating film, interposing so that said stopper film is interposed between said lower and upper insulating films;

forming a via hole leading from the surface of said upper insulating film to the surface of said stopper film at the position where opposite said first conductor is located below;

applying the a film of said via-filling material of Claim 3 on the surface of to said upper insulating film to fill and filling said via hole with said via-filling material; solidifying said via-filling material;

forming a resist pattern defining an opening part, including said via hole, on the applied film made of a via filling body obtained by solidifying said via-filling material;

forming a trench of a depth which that does not reach said stopper film in said upper insulating film by dry etching said upper insulating film and said via-filling body material, using said resist pattern as a mask;

removing said resist pattern, the film of said applied film made of via-filling body material, and said via-filling body material remaining in said via hole and;

etching said stopper film appeared on the bottom of exposed in said via hole, thereby exposing said first conductor; and

forming a second conductor in said trench and in said via hole.

12. (Currently Amended) A process for fabricating a semiconductor integrated circuit, which comprises the steps of comprising:

forming an insulating film on a substrate;

forming a via hole in said insulating film;

applying the a film of said via-filling material of Claim 3 on the surface of said insulating film to fill and filling said via hole with said via-filling material;

solidifying said via-filling material;

forming a resist pattern defining an opening part, including said via hole, on the applied film made of a via filling body obtained by solidifying said via-filling material;
forming a trench of a depth which that does not reach said substrate in said insulating film by dry etching said insulating film and said via-filling body material, using said resist pattern as a mask;
removing said resist pattern, applied the film made of said via-filling body material, and said via-filling body material remaining in said via hole; and
forming a conductor in said trench and in said via hole.

13. (Currently Amended) A process for fabricating a semiconductor integrated circuit, ~~which comprises the steps of comprising:~~

forming a stopper film on the surface of a lower insulating film on which a first conductor is formed present and laminating depositing an upper insulating film, interposing so that said stopper film is interposed between said lower and upper insulating films;
forming a via hole leading from the surface of said upper insulating film to the surface of said stopper film at the position where opposite said first conductor is located below;
applying the a film of said via-filling material of Claim 8 on the surface of to said upper insulating film to fill and filling said via hole with said via-filling material;
solidifying said via-filling material;
forming a resist pattern defining an opening part, including said via hole, on the applied film made of a via filling body obtained by solidifying said via-filling material;
forming a trench of a depth which that does not reach said stopper film in said upper insulating film by dry etching said upper insulating film and said via-filling body material, using said resist pattern as a mask;
removing said resist pattern, the film of said applied film made of via-filling body material, and said via-filling body material remaining in said via hole and;
etching said stopper film appeared on the bottom of exposed in said via hole, thereby exposing said first conductor; and
forming a second conductor in said trench and in said via hole.

14. (Currently Amended) A process for fabricating a semiconductor integrated circuit, ~~which comprises the steps of comprising:~~

forming an insulating film on a substrate;
forming a via hole in said insulating film;
applying the a film of said via-filling material of Claim 8 on the surface of said insulating film to fill and filling said via hole with said via-filling material;
solidifying said via-filling material;

forming a resist pattern defining an opening part, including said via hole, on the applied film ~~made of a via-filling body obtained by solidifying said via-filling material;~~

forming a trench ~~of a depth which that~~ does not reach said substrate in said insulating film by dry etching said insulating film and said via-filling ~~body material~~, using said resist pattern as a mask;

removing said resist pattern, ~~applied the film made of said via-filling body material,~~ and ~~said via-filling body material~~ remaining in said via hole; and

forming a conductor in said trench and in said via hole.